clearly define the role of speciality vascular care for improving rescue rates.

AUTHOR CONTRIBUTIONS

Conception and design: MM, MS
Analysis and interpretation: MM, CB, AK, MS
Data collection: MM, MS
Writing the article: MM
Critical revision of the article: CB, AK, MS
Final approval of the article: MM, CB, AK, MS
Statistical analysis: MM, CB, AK, MS
Obtained funding: MS
Overall responsibility: MM

REFERENCES

1. Hallin A, Bergqvist D, Holmberg L. Literature review of surgical management of abdominal aortic aneurysm. Eur J Vasc Endovasc Surg 2001;22:197-205.
2. Heller J, Weinberg A, Arons R, Krishnasastry KV, Lyon RT, Deitch JS, et al. Two decades of abdominal aortic aneurysm repair: have we made any progress? J Vasc Surg 2000;32:1091-8.
3. Dimick JB, Pronovost PJ, Cowan JA, Lipsett PA, Stanley JC, Upchurch GR. Variation in postoperative complication rates after high-risk surgery in the United States. Surgery 2003;134:534-41.
4. Birkmeyer JD, Siewers AE, Finlayson EV, Stukel TA, Lucas FL, Batista I, et al. Hospital volume and surgical mortality in the United States. N Engl J Med 2002;346:1128-37.
5. Dimick JB, Upchurch GR. Endovascular technology, hospital volume, and mortality with abdominal aortic aneurysm surgery. J Vasc Surg 2008;47:1150-4.
6. Brooke BS, Perler BA, Dominici F, Makary MA, Pronovost PJ. Reduction of in-hospital mortality among California hospitals meeting Leapfrog evidence-based standards for abdominal aortic aneurysm repair. J Vasc Surg 2008;47:1155-64.
7. Pope GC, Kautter J, Ellis RP, Ash AS, Ayanian JZ, Lezzoni LI, et al. Risk adjustment of Medicare capitation payments using the CMS-HCC model. Health Care Financ Rev 2004;25:119-41.
8. Morris AM, Baldwin LM, Matthews B, Dominitz J, Barlow WE, Dobie SA, et al. Reoperation as a quality indicator in colorectal surgery: a population-based analysis. Ann Surg 2007;245:73-9.
9. Ghaferi AA, Birkmeyer JD, Dimick JB. Complications, failure to rescue, and mortality with major inpatient surgery in Medicare patients. Ann Surg 2009;250:1029-34.
10. Silber JH, Rosenbaum PR, Trudeau ME, Chen W, Zhang X, Kelz RR, et al. Changes in prognosis after the first postoperative complication. Med Care 2005;43:122-31.
11. Houghton A. Variation in outcome of surgical procedures. Br J Surg 1994;81:653-60.
12. Ghaferi AA, Birkmeyer JD, Dimick JB. Variation in hospital mortality associated with inpatient surgery. N Engl J Med 2009;361:1368-75.
13. Friese CR, Lake ET, Aiken LH, Silber JH, Sochalski J. Hospital nurse practice environments and outcomes for surgical oncology patients. Health Serv Res 2008;43:1145-63.
14. Silber JH, Williams SV, Krakauer H, Schwartz JS. Hospital and patient characteristics associated with death after surgery. A study of adverse occurrence and failure to rescue. Med Care 1992;30:615-29.
15. Wilchesky M, Tamblyn R, Huang A. Validation of diagnostic codes within medical services claims. J Clin Epidem 2004;57:131-41.
16. Kiyota Y, Schneeweiss S, Glynn RJ, Cannuscio CC, Avorn J, Solomon DH. Accuracy of Medicare claims-based diagnosis of acute myocardial infarction: estimating positive predictive value on the basis of review of hospital records. Am Heart J 2004;148:99-104.
17. Quan H, Parsons GA, Ghali WA. Validity of procedure codes in International Classification of Diseases, 9th revision, clinical modification administrative data. Medial Care 2004;42:801-9.
18. Donabedian A. The end results of health care: Ernest Codman's contribution to quality assessment and beyond. Milbank Q 1989;67:233-56.

Submitted Oct 2, 2010; accepted Jan 11, 2011.

DISCUSSION

Dr James W. Holcroft *(Sacramento, Calif)*. The authors found that the 30-day mortality rate after elective abdominal aneurysmectomy in Medicare beneficiaries was 2.5% when the operation was done by a vascular surgeon and 2.7% when done by a general or cardiac surgeon. If, however, the patient had a postoperative complication that required reoperation, the death rate skyrocketed, and a large gap in the mortality rates emerged when comparing the vascular surgeons with the cardiac and general surgeons. This study has implications. I have two questions.

Can you glean from the data why some patients went to vascular surgeons for their operations while others went to general or cardiac surgeons? In particular, were patients who lived in rural areas more likely to have their operations done by a local general or cardiac surgeon? Did it seem to be mostly a matter of convenience for the patients and families, not wanting to drive long distances for the preoperative evaluation and the postoperative follow-up, not to mention the need for the families to find lodging near the hospital in the big city during the stay for the operation itself?

And second, what should we as a profession do with this information? The death rate in the patients with complications was 16% when the operation was done by a vascular surgeon, which is uncomfortably high, but the death rate with the nonvascular surgeons, of 32%, is flat out distressing. We frequently talk about number needed to benefit when talking about a potentially beneficial intervention. In this case, one could talk about the number killed with an intervention. For every 6.25 patients with a postoperative complication requiring a reoperation, one will die if the surgeon taking care of the patient is a general or cardiac surgeon, compared with a vascular surgeon. That should make any patient think twice. After all, one doesn't know going into an operation if a complication is going to develop.

I am sure that there are many general and cardiac surgeons who do a good job with aortic surgery. And I assume that there must be some vascular surgeons who do a poor job. Thus it wouldn't seem fair to single out all general and cardiac surgeons and make it difficult for them to do these procedures.

On the other hand, I don't think that we can stand idly by and do nothing. One way to get at this problem might be to mandate participation in the National Surgery Quality Improvement Program (NSQIP) if a hospital is going to be reimbursed for aortic surgery. We should all be participating anyway, and it wouldn't be asking too much to set the bar a little higher when dealing with an operation that has the potential for having such disastrous results. The information from the NSQIP findings would allow a hospital to deal with problems, if they were present, and it would make the process fair. No one would be shut out of doing a procedure that he or she did well; and no one would be given carte blanche approval to do these procedures without scrutiny of his or her results.

In general, I don't like having the government impose standards on physicians. Better than having others do it, we, as members of the profession, could take the initiative. In either case, I don't think that these findings can be ignored.

Dr Matthew Mell. Thank you Dr Holcroft for your comments. Our data demonstrated that patients greater than age 85

were 55% more likely to be treated by vascular surgeons. Patient comorbidity was not a factor. The impact of rural residence is the subject of another manuscript. To summarize, 15% of the cohort resided in rural areas and 15% resided in small towns. Regardless of residence, 93.9% of repairs were performed in urban centers. Although type of residence had no impact on the likelihood of being treated by a vascular surgeon (rural 48% vs urban 50%; $P = .82$), rural patients were more likely to be treated in high-volume centers (rural 52% vs urban 42%, $P < .001$). These results would suggest that for complex conditions such as abdominal aortic aneurysms, patients are willing to travel to receive quality care. Clinical factors such as the severity of comorbid conditions or anatomic information were not available for analysis from this administrative data set.

With regard to your second question, it remains important to have salient quality measures for aneurysm repair as new technology alters the skill sets required to perform a safe procedure. Setting standards becomes appropriate only after acceptable metrics have been defined. Recent improvements in mortality and complication rates make these measurements more difficult to use as benchmarks after AAA repair since many procedures would need to be performed before accurately measuring differences between hospitals or physicians. Our study adds to the body of research that failure to rescue after complications is an important quality measure. Differences in outcomes after AAA were explained by not the frequency but by the management of complications, most specifically vascular complications. Improved rescue after arterial complications highlights the importance of specialty vascular training when treating vascular conditions with potential vascular complications, and suggests that available vascular expertise is an important metric in defining quality AAA care.